Claims

1. (Previously Amended) An emitter, comprising:

an electron supply;

a cathode layer; and

a tunneling layer disposed between the electron supply and the cathode layer wherein the electron supply, cathode layer, and tunneling layer have been subjected to an annealing process.

2. (Original) The emitter of claim 1 wherein the tunneling layer is a metal cluster dielectric.

3. (Original) The emitter of claim 1 wherein the tunneling layer is a metal cluster dielectric selected from the group consisting of TiO_x, TaO_x, WSiN, $TaAlO_xN_y$, $TaAlO_x$ and AlO_xN_y.

4. (Original) The emitter of claim 1 wherein the cathode layer is selected from the group consisting of platinum, gold, molybdenum, tantalum, iridium, ruthenium, chromium, and alloys thereof.

5. (Original) The emitter of claim 1 operable to provide an emission current of greater than 1×10^{-2} Amps per square centimeter.

6. (Original) The emitter of claim 1 operable to provide an emission current of greater than 1×10^{-1} Amps per square centimeter.

7. (Previously Amended) The emitter of claim 1 operable to provide an emission current of greater than 1×10^{0} Amps per square centimeter.

8. (Original) The emitter of claim 1wherein the tunneling layer has a thickness less than about 500 Angstroms.

9. (Original) The emitter of claim 1 wherein the tunneling layer has a thickness less than about 250 Angstroms.

10. (Original) The emitter of claim 1 wherein the tunneling layer has a thickness less than about 100 Angstroms.

11. (Original) The emitter of claim 1 wherein the tunneling layer has a thickness of about 50 Angstroms.

12. (Original) The emitter of claim 1 wherein the tunneling layer has a thickness within the range of about 50 to about 250 Angstroms.

13. (Original) An integrated circuit, comprising:

a substrate;

the emitter of claim 1 disposed on the substrate; and

circuitry for operating the emitter formed on the substrate with the emitter.

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14. (Original) An electronic device, comprising:

the emitter of claim 1 capable of emitting energy; and

an anode structure capable of receiving the emitted energy and generating at least a first effect in response to receiving the emitted energy and a second effect in response to not receiving the emitted energy.

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15. (Original) The electronic device of claim 14 wherein the electronic device is a mass storage device and the anode structure is a storage medium, the electronic device further comprising a reading circuit for detecting the effect generated on the anode structure.

16. (Original) The electronic device of claim 14 wherein the electronic device is a display device and the anode structure is a display screen that creates a visible effect in response to receiving the emitted energy.

17. (Original) The electronic device of claim 16 wherein the display screen includes one or more phosphors operable for emitting photons in response to receiving the emitted energy.

Claims 18-20 (Cancelled).

21. (Original) An emitter, comprising:

an electron supply layer;

an insulator layer formed on the electron supply layer and having an opening defined within;

a tunneling layer formed on the electron supply layer in the opening; and

a cathode layer formed on the tunneling layer;

wherein the emitter has been subjected to an annealing process to increase the supply of electrons tunneled from the electron supply layer to the cathode layer for energy emission.

22. (Original) The emitter of claim 21 capable of emitting photons in addition to the electron emission.

23. (Original) The emitter of claim 21 wherein the tunneling layer is a metal cluster dielectric.

24. (Original) The emitter of claim 21 wherein the cathode layer has an emission rate greater than about 0.01 Amps per square centimeter.

25. (Original) The emitter of claim 21 wherein the tunneling layer is a metal cluster dielectric selected from the group consisting of TiO_x, TaO_x, WSiN, $TaAlO_xN_y$, $TaAlO_x$ and AlO_xN_y.

26. (Original) The emitter of claim 21 wherein the tunneling layer has a thickness less than 500 Angstroms.

27. (Original) The emitter of claim 21 wherein the tunneling layer has a thickness between about 50 Angstroms and about 250 Angstroms.

28. (Original) A display device, comprising:

an integrated circuit including the emitter of claim 21, wherein the emitter emits a visible light source; and

a lens for focusing the visible light source, wherein the lens is coated with a transparent conducting surface to capture electrons emitted from the emitter.

29. (Original) A storage device, comprising:

an integrated circuit including the emitter of claim 21 wherein the emitter creates an electron beam current; and

a storage medium in close proximity to the emitter, the storage medium having a storage area being in one of a plurality of states to represent the information stored in that storage area;

such that:

an effect is generated when the electron beam current bombards the storage area;

the magnitude of the effect depends on the state of the storage area; and

the information stored in the storage area is read by measuring the magnitude of the effect.

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30. (Original) An electronic device, comprising:

an integrated circuit including the emitter of claim 21; and

a focusing device for converging the emissions from the emitter.

31. (Original) A computer system, comprising:

a microprocessor;

the electronic device of claim 30 coupled to the microprocessor; and

memory coupled to the microprocessor, the microprocessor operable of executing instructions from the memory to transfer data between the memory and the electronic device.

32. (Original) The computer system of claim 31 wherein the electronic device is a storage device.

33. (Original) The computer system of claim 31 wherein the electronic device is a display device.

34. (Previously Amended) An emitter, comprising:

an electron supply surface;

an insulator layer formed on the electron supply surface and having a first opening defined within;

an adhesion layer disposed on the insulator layer, the adhesion layer defining a second opening aligned with the first opening;

a conductive layer disposed on adhesion layer and defining a third opening aligned with the first and second openings;

a tunneling layer formed on the electron supply layer within the first, second, and third openings; and

a cathode layer disposed on the tunneling layer and portions of the conductive layer, wherein the portion of the cathode layer on the tunneling layer is an electron-emitting surface wherein the emitter has been subjected to an annealing process.

35. (Original) The emitter of claim 34 wherein the electron emitting surface has an emission rate of about 0.1 to about 1.0 Amps per square centimeter.

36. (Original) The emitter of claim 34, wherein the tunneling layer is a metal cluster dielectric film from the group consisting of TaO_x, WSiN, TiO_x, $TaAlO_xN_y$, $TaAlO_x$, and AlO_xN_y.

37. (Original) The emitter of claim 34, wherein the tunneling layer has a thickness between about 50 Angstroms to about 250 Angstroms.

38. (Original) The emitter of claim 34, wherein the tunneling layer has a thickness of about 100 Angstroms.

39. (Original) The emitter of claim 34, wherein the tunneling layer has a thickness less than about 500 Angstroms.

40. (Original) The emitter of claim 34 wherein the electron-emitting surface also emits photon energy.

Claims 41-71 (Cancelled).